Method and Apparatus for Opportunistic Decision Support from Intermittent Interconnected Sensors and Data Archives

Abstract of the Disclosure

Described is a method and apparatus for obtaining accurate, timely information for event detection and prediction based on *autonomous opportunism*. The objective is to make the best possible use of all available resources at the time of acquisition, including historical data, multiple sensors, and multiresolution acquisition capabilities, under a given set of processing and communication bandwidth constraints. This method (and the corresponding apparatus) fuses multiple adaptively acquired data sources to prepare information for use by decision support models. The onboard data acquisition schedule is constructed to maximize the prediction accuracy of the decision models, which are designed to operate progressively, utilizing data representations consisting of multiple abstraction levels and multiple resolutions. Due to the progressive nature of these models, they can be executed onboard even with the use of substantially summarized (or compressed) datasets delivered from the ground or from other satellite platforms. Models are formulated to accept data with less than complete certainty, thus allowing real-time decisions to be made on locations where additional data is to be acquired based on predicted likelihood of the event of interest and uncertainties. Multi-abstraction-level multi-resolution data is expressed using standard-compliant representations, and progressively transmitted to the ground or other platforms. More detailed calculations can then be performed on the ground using all of the available real time and historical data.